

# Extrinsic Risk

## Introduction to the Special Issue

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Studies of human life history are focused on two fundamental decisions: to reproduce now or later, and quantity versus quality—how many offspring to produce and how much to invest in each (Borgerhoff-Molder 1992; Chisholm 1999; Hill and Kaplan 1999; Stearns 1992). Life history theory describes the timing of life course events (e.g., age at sexual maturity, birth spacing, length of parental investment) as adaptive, species-typical responses shaped by natural selection and as phenotypically variable responses of individuals within and between populations, given a species-typical range (Ellis et al. 2009). The papers contained in this special edition of *Human Nature* draw on theoretical developments exploring human behavioral diversity in life-history-shaping decisions within and between populations in response to various environmental conditions. Here, the environmental conditions of interest are conceptualized as components of extrinsic risk. Extrinsic risk is any unavoidable ecological factor that reduces an offspring's reproductive value and is immune to reduction through enhanced parental investment (Quinlan 2006). Life history studies on extrinsic risk have typically focused on the effect of extrinsic mortality (e.g., Pennington and Harpending 1988); however, more recently the importance of non-lethal risks has also been elaborated (see Ellis et al. 2009 for review of extrinsic morbidity-mortality).

The theme of this special edition grew from two papers exploring extrinsic risk and behavior (Quinlan 2010; Schechter and Francis 2010) originally presented at an invited session organized by Brooke Scelza and Dawn Neill, and sponsored by the Evolutionary Anthropology Society, at the 2008 meetings of the American Anthropological Association. The session, entitled, “Evolutionary Perspectives on

Health and Nutrition,” included a wide range of topics spanning evolutionary approaches to health. The focus on extrinsic risk by Quinlan and Schechter highlighted many of the elements the session sought to explore by focusing on health from a life history theory perspective. Health research is generally conducted under a variety of paradigms within public health and nutrition that seek to modify behaviors leading to disease and death in order to improve health and longevity. Alternatively, life history theory provides a framework that addresses how organisms allocate time and energy, given constraints, in a way that optimizes an outcome of fitness, or some fitness proxy (Chisholm 1999; Stearns 1992). Given the costs and benefits of behavioral decisions and ecological constraints, it is expected that optimal allocations will vary across the life course, by gender and in response to local environmental conditions, including extrinsic risks. Unlike traditional health behavior research, a life history theory approach to health behavior would suggest that, rather than maximizing health or longevity, humans make tradeoffs that have both long- and short-term consequences that can affect health in negative as well as positive ways (Hill 1993). Thus, the aim of the AAA session was to highlight the potential contribution of life history theory-driven approaches to understanding health and health behavior.

Each of the papers contained here explores aspects of extrinsic risk with explicit linkages to understanding behaviors affecting health outcomes. Anderson and Quinlan each employ measures indicative of extrinsic mortality to examine reproductive behavior. The article by Schechter and Francis combines life history and attachment theories to examine how family environmental uncertainty impacts engagement in risky behaviors and educational performance, both of which can effect health outcomes in the short- and long-term. Neill explores the effect of rural-to-urban migration on parental investments in education, conceptualizing the limits imposed by rural opportunity structure as extrinsic risk.

As stated by Anderson (2010), “life history theory predicts that greater extrinsic mortality will lead to earlier and higher fertility.” Anderson draws on nationally representative cross-sectional household data from the Demographic Household Survey. DHS questionnaires provide measures of population and health and are designed to be consistent across countries to facilitate cross-cultural comparisons. The analyses examine the relationship between life expectancy at birth and several proxies for life history traits, with special attention to understanding the tradeoffs involved in earlier and higher fertility behavior and the risk of death from HIV/AIDS. Interestingly, the results provide only partial support for the predictions, with greater support among women than men and inconsistent results for sub-Saharan African countries. Rather than viewing mortality as a potential outcome of engaging in high-risk sexual behavior, life history suggests that mortality may also be a cause of engagement in risk behaviors. The study highlights the utility of life history theory-based approaches to provide insight into why HIV/AIDS health campaigns have not succeeded in reducing risky sexual behavior that may increase the chance of contracting the disease.

Quinlan (2010) also examines the effect of extrinsic mortality on reproductive schedules. Quinlan focuses on historical longitudinal data using infant mortality rates during infancy and at maturity between 1925 and 2000 as predictors of age at first birth and pace of reproduction among women in rural Dominica. Results show a

quadratic association between mortality rates both in infancy and at maturity, and age at first birth. Low mortality favored relatively later reproduction, moderately high mortality favored earlier reproduction, but very high mortality favored even later reproduction. Further, the analyses show that when early-life conditions are extremely harsh, later conditions are less influential in shaping reproductive behavior. A discussion of timing and the mechanisms through which behavioral plasticity and risk sensitive phenotypes emerge links these analyses to health and behavior.

Schechter and Francis (2010) also contribute to linking developmental plasticity and extrinsic risks, further highlighting the linkages between life history theory approaches and health behavior. Drawing on a combination of life history and attachment theory, they examine the association between environmental uncertainty and risk-behavior attitudes and educational effort using cross-sectional data from Native American youth aged 10–19 years. Schechter and Francis ask, “Why do young people willingly engage in behaviors that have negative social and health consequences?”

They then point to research highlighting the mismatch between the effectiveness of public health awareness campaigns that seek to educate teens on the negative consequences of risky behavior, such as with smoking and lung cancer, and continuance of said behaviors. To explore these associations, they present a model connecting family environmental uncertainty with attachment and the development of youth time preference, suggesting that a phenotypic developmental response to greater environmental uncertainty (problems with attachment) results in future discounting and the valuing of immediate over delayed rewards. Results support the idea that environmental risk and uncertainty are internalized during development, showing that a less future-oriented time perspective and higher cortisol levels predicted higher risk attitudes, and that a more future-oriented time perspective and fewer problems with attachment predicted higher self-reported school performance.

Neill (2010) seeks to contribute a life history theory-driven approach to understanding issues associated with urbanization, migration, and parental investment. Rural to urban migration is a dynamic demographic phenomenon in contemporary developing countries. Urban migration is generally associated with changes in fertility, nutrition, education, and wage-earning work associated with human capital and intensification of quality-based parental investment—all of which affect health and health behavior in rapidly urbanizing environments. In her paper, Neill seeks to shed light on some of the causes and consequences of rural-to-urban migration. Drawing on a more expansive definition of extrinsic risk as any external factor that decreases reproductive value and is immune to reduction through enhanced parental investment, Neill considers external conditions associated with variation in the rural and urban opportunity structures as risks that provide a saturation point for parental investment in education. Migration to the urban area is conceptualized as a risk-reduction strategy employed by parents. Results demonstrate a quantity-quality relationship that is correlated with opportunity structure, showing that rural families exhibit a quantity-based strategy, urban non-migrants a quality-based strategy, and urban migrants an intermediate strategy.

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## References

- Anderson, K. G. (2010). Life expectancy and the timing of life history events in developing countries. *Human Nature*, 21. doi:[10.1007/s12110-010-9087-z](https://doi.org/10.1007/s12110-010-9087-z).
- Borgerhoff-Molder, M. (1992). Reproductive decisions. In E. A. Smith & B. Winterhalder (Eds.), *Evolutionary ecology and human behavior* (pp. 339–374). New York: Aldine de Gruyter.
- Chisholm, J. S. (1999). *Death, hope and sex: Steps to an evolutionary ecology of mind and morality*. New York: Cambridge University Press.
- Ellis, B. J., Figueredo, A. J., Brumbach, B. H., & Schlomer, G. L. (2009). Fundamental dimensions of environmental risk: the impact of harsh versus unpredictable environments on the evolution and development of life history strategies. *Human Nature*, 20, 204–268.
- Hill, K. (1993). Life history theory and evolutionary anthropology. *Evolutionary Anthropology*, 2, 78–88.
- Hill, K., & Kaplan, H. (1999). Life history traits in humans: theory and empirical studies. *Annual Review of Anthropology*, 28, 397–438.
- Neill, D. B. (2010). Expanding opportunity structures: parental investments in education, migration, and extrinsic risk reduction among Indo-Fijians. *Human Nature*, 21. doi:[10.007/s12110-010-9086-0](https://doi.org/10.007/s12110-010-9086-0).
- Pennington, R., & Harpending, H. (1988). Fitness and fertility among the Khalahari !Kung. *American Journal of Physical Anthropology*, 77, 303–319.
- Quinlan, R. J. (2006). Human parental effort and environmental risk. *Proceedings of the Royal Society B*, 274, 121–125.
- Quinlan, R. J. (2010). Extrinsic mortality effects on reproductive strategies in a Caribbean community. *Human Nature*, 21. doi:[10.1007/s12110-010-9085-1](https://doi.org/10.1007/s12110-010-9085-1).
- Schechter, D. E., & Francis, C. (2010). A life history approach to understanding youth time preference: mechanisms of environmental risk and uncertainty and attitudes toward risk behavior and education. *Human Nature*, 21. doi:[10.1007/s12110-010-9084-2](https://doi.org/10.1007/s12110-010-9084-2).
- Stearns, S. (1992). *The evolution of life histories*. Oxford: Oxford University Press.